Attached document 2 is instruction manual for instrument for measuring surface roughness which is used for measuring surface roughness in Takkai2001-59029, column [0042], (4) Surface roughness.

The Instrument for measuring surface roughness (SE-3F) made of KOSAKA LABORATORY Ltd. is composed of SE-3C and AY-22 which are explained in the MANUAL.

DOCUMENT 2

UNIVERSAL INSTRUMENT FOR MEASURING SURFACE CONFIGURATION

MODEL SE-3C

INSTRUCTION MANUAL

KOSAKA LABORATORY Ltd.

(p.1)

1 PREFACE

Accuracy of processed parts, particularly fine configuration (surface roughness, surface wave motion, damage, pattern formed by processing, etc.) , and accuracy of the shape including straightness strongly influence not only the quality of the processed parts themselves, but the function and properties of the final products.

Our company do not treat surface roughness and surface wave motion independently as single industrial parameter, but regard them as fine configurations including faults formed on the surface of processed products, patterns formed by processing, troubles of surface layer, etc. Our company always positively promote the development and improvement of measuring instruments for measuring the shape and quantity of a fine configuration.

UNIVERSAL INSTRUMENT FOR MEASURING SURFACE CONFIGURATION SE-3C is a universal type with which fine configuration of a surface and accuracy of a shape including straightness as described above can be measured simply,, accurately , so that it proves its greater merit at factories, test laboratories, and research laboratories.

We intended to arrange the contents, terms, symbols which are used in this instruction manual in accordance with JIS-B0601, 0619, and 0651, and to use simple representation as much as possible.

2. CHARACTERISTICS

1)

2)

3) wide measurement range : from highest sensitivity 0.001 μ m to maximum 600 μ m.

(p.7,8)

4.3 DETECTOR

PU-DJ2 and PU-DW800 are attached to this instrument. These detectors have the same structure except that the quality of the material of probe, tip radius and measurement power differ.

① probe

Carefully handle the probe because it is particularly precisely assembled.

In the case of PU-DJ2, the probe is made of diamond and has very small tip radius of 2 μ m, and, therefore, shock may causes damage of the probe. The lifetime of the

probe greatly differ depending on the quality of the material and the state of the surface of the objects to be measured. The lifetime of the probe is about 100mm in terms of measurement distance.

(p.13)

5.3 MEASUREMENT OF THE MEAN VALUE

5.3.1 SEQUENCE of THE MEASUREMENT OF THE MEAN VALUE

5.3.2 HOW TO READ AND INDICATE THE MEAN VALUE

① READING OF THE MEAN VALUE

② HOW TO INDICATE

i. Center Line average roughness

center Line average roughness μm, cut off value mm or μm Ra, λc mm

ii Square average roughness

(p.20)

9. SPEC

9.1 RATING

1) name and type UNIVERSAL INSTRUMENT FOR MEASURINGSURFACE CONFIGURATION SE-3C

2) method of measurement measurement by moving the detector
probe electric system
indication system of the integrated value

3) items which can be measured
Ra, RMS, WCA, WEA (by indication of the meter)
Rmax, Rz, Rt, WCM, WEM, straightness
(by recording)

(p.21)

9.3 COMBINATION

1) detector PU-DJ2

2) detector PU-DW800

3) device for feeding DR-100X11

4) device for indication of magnification AS-3C

5) RECORDER RA-60A

EQUIPMENT FOR ANALYZING ROUGHNESS AY-22

INSTRUCTION MANUAL

1 PREFACE

By using this equipment together with UNIVERSAL INSTRUMENT FOR MEASURING SURFACE CONFIGURATION with which RA-60A recorder is attached, values of various parameters which represent surface roughness can be measured from the same profile by simple knob operation. Measured values can usually be printed along with the profile on the paper for recording the profile.

7. Definition of parameters

1) MAXIMUM HEIGHT Rmax (see Figure 3)

2) AVERAGE ROUGHNESS OF TEN POINTS Rz (see Figure 3)

3) CENTER LINE AVERAGE ROUGHNESS Ra (see Figure 4)

The measured length L toward the direction of the center line is extracted from surface roughness curve. . When the center line of the extracted part is decided as X axis, and the surface roughness curve is expressed by Y = f(x), Ra is given by the following formula in μm unit.

Ra = ****